



GSMP:

General Specifications Change Notification (GSCN)

WR #	GSCN Name	Effective Date
16-0146	MRO (Maintenance, Repair and Overhaul processes in Rail)	12-12-2016

Associated Work Request (WR) Number:

Insert the associated WR number here (if applicable)

Background:

Proposed changes to General Specifications as a result of the MRO in Rail project

GS1 General Specification Change:

Insert the actual changes to the Gen Spec here.



The Global Language of Business

MRO in Rail GSCN

Proposed changes to General Specifications as a result of the MRO in Rail project

Release i1.eb2, Candidate, 8-Dec-2016





1 **Log of Changes**

Release	Date of Change	Changed By	Summary of Change
i1.eb1	30-Nov-2016	Coen Janssen	Version for eBallot. Track changes are relative to the current version of the GS1 General Specifications (v16).
I1.eb2	8-Dec-2016	Coen Janssen	Erratum in section 2.1.2.6.1, for 'trade items used in manufacturing and maintenance, repair and overhaul (MRO) processes' added GTIN-14 as allowed option, to ensure consistency with section 2.1.4 Direct Markin..

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Table of Contents

4

5 **2** **4**

6 2.1 Trade items..... 4

7 2.1.2 Fixed measure trade items – open supply chain..... 4

8 2.1.4 Direct marking 12

9 2.7 Summary of applications and operative scanning environments for GS1 system symbols 17

10 2.3 Assets 18

11 2.3.1 Global Returnable Asset Identifier (GRAI): AI (8003) 18

12 2.3.2 Global Individual Asset Identifier (GIAI): AI (8004)..... 20

13 2.4 Locations and parties..... 22

14 2.4.3 Application overview 22

15 **3** **23**

16 3.2 GS1 Application Identifiers in numerical order..... 23

17 3.7 29

18 3.7.1 GLN of the production or service location: AI (416)..... 29

19 3.8 29

20 3.8.1 Refurbishment lot ID: AI (7020)..... 29

21 3.8.2 Functional status: AI (7021) 30

22 3.8.3 Revision status: AI (7022) 30

23 3.8.4 Global Individual Asset Identifier of an assembly: AI (7023) 30

24 3.9 31

25 3.9.4 Global Returnable Asset Identifier (GRAI): AI (8003) 31

26 3.9.5 Global Individual Asset Identifier (GIAI): AI (8004)..... 32

27 **4** **32**

28 4.3 GTIN rules..... 32

29 4.3.1 Allocating the numbers..... 32

30 4.5 Rules for GS1 asset identifiers 33

31 4.5.1 General rule 33

32 4.5.2 Allocating Global Returnable Asset Identifiers (GRAIs): AI (8003) 34

33 4.5.3 Allocating Global Individual Asset Identifiers (GIAIs): AI (8004) 34

34 4.5.4 Change of asset ownership 35

35 4.5.5 Information associated with asset identifiers 35

36 4.13 35

37 4.13.2 Mandatory association of element strings..... 35

38 **5 Data carriers**..... **36**

39 5.5 Barcode production and quality assessment..... 36

40 5.5.2 Dimensional specifications and operational requirements 36

41

42



43 **2**

44 **2.1 Trade items**

45 **2.1.2 Fixed measure trade items – open supply chain**

46 **2.1.2.6 Trade items intended for general distribution scanning only**

47 Every trade item that is different from another in any respect is assigned a unique Global Trade
48 Item Number (GTIN). This includes trade item groupings of retail and non-retail trade items that are
49 also trade items, and non-retail single units. For example, each of the packaging types in the figure
50 below, if traded, is assigned a separate GTIN.

51 **Figure 2.1.2.6-1. Example of GTIN numbering options**

Trade item	GTIN numbering options			
	GTIN-8	GTIN-12	GTIN-13	GTIN-14
Single product A	X	X	X	
50 x product A (Trade item grouping)		X	X	X
50 x product A (Trade item grouping, e.g., display case)		X	X	X
100 x product A (Trade item grouping)		X	X	X
Single product B	X	X	X	
50 x product A 50 x product B		X	X	

52 **2.1.2.6.1 Identification of a trade item that is a single product**

53 **Application description**

54 The manufacturer or supplier has the option of assigning a unique GTIN-8, GTIN-12, GTIN-13 or in
55 the case of regulated healthcare trade items [and trade items used in manufacturing and](#)
56 [maintenance, repair and overhaul \(MRO\) processes](#), GTIN-14 to a trade item that is a single product
57 as shown in figure 2.1.2.6.1-1. Restricted Circulation Numbers (RCNs) must not be used in this
58 element string.

59 **GS1 key**

60 **Definition**

- 61 ■ The GTIN-8 is the 8-digit GS1 identification key composed of a GS1-8 Prefix, item reference,
62 and check digit used to identify trade items.
- 63 ■ The GTIN-12 is the 12-digit GS1 identification key composed of a U.P.C. Company Prefix, item
64 reference, and check digit used to identify trade items.
- 65 ■ The GTIN-13 is the 13-digit GS1 identification key composed of a GS1 Company Prefix, item
66 reference, and check digit used to identify trade items.
- 67 ■ For regulated healthcare trade items [and trade items used in manufacturing and maintenance,](#)
68 [repair and overhaul \(MRO\) processes](#) the GTIN-14 is the 14-digit GS1 identification key
69 composed of an indicator digit (1-9), GS1 Company Prefix, item reference, and check digit used
70 to identify trade items.

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Rules

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In addition to the GTIN Allocation Rules described in section 4, the following guidelines should be observed: GTIN-8 can only be used when all other pack size constraints are met.

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Before deciding to use a GTIN-8 as opposed to a GTIN-12, GTIN-13, or in the case of regulated healthcare trade items, GTIN-14, companies, working jointly with their printer, should consider options such as:

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- Whether the barcode can be reduced in size (e.g., printed at a lower X-dimension, taking into account the minimum barcode print quality requirements (see section 5.5).

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- Whether the label or artwork can reasonably be changed to enable the inclusion of an EAN-13 or a UPC-A barcode or a symbol from the GS1 DataBar Retail POS family.

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- For example, redesigning the label and increasing the label size may be an option, especially when the existing label is small in comparison with the pack area.

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- Whether a truncated barcode can be used.

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Note: A truncated barcode (normal length, but reduced in height) may only be used if there is absolutely no possibility of printing a full size barcode. Truncation removes the omnidirectional scanning capability. A barcode with excessive truncation will not be of any practical use. Users considering this option should consult their customers to see if an acceptable compromise can be reached.

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Pack size constraints

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The use of a GTIN-8 is authorised when:

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- The total printable area of the product packaging is less than 80 cm², or

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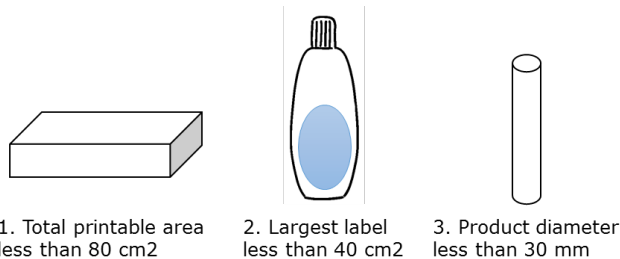
- The area of the largest label for the item is less than 40 cm², or

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- The product is cylindrical with a diameter less than 30 mm.

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Figure 2.1.2.6.1-1. GTIN-8 pack size constraints



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Attributes

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Required

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For regulated healthcare consumer trade items the following levels of AIDC marking are specified.

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Figure 2.1.2.6.1-2. Overview of required attributes

AIDC marking level for regulated healthcare trade items	Key	Batch/lot number - AI (10)	Expiration date - AI (17)	Serial number - AI (21)	Other
Minimum	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	Yes	Yes	No	None



AIDC marking level for regulated healthcare trade items	Key	Batch/lot number - AI (10)	Expiration date - AI (17)	Serial number - AI (21)	Other
Enhanced	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	Yes	Yes	No	None
Highest – Brand owner AIDC marking	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	Yes	Yes	Yes	Potency AI (7004) for pharmaceutical, and for medical device kits with pharmaceutical (cases only for both situations)
Highest – Hospital AIDC marking of pharmaceutical	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	No	AI (7003) for short-life products	Yes	None
Hospital AIDC marking of medical devices	No	No	No	No	None

To manage healthcare data requirements within EPC/RFID tags, see section 3.11 and the most recent version of the *EPC Tag Data Standard*.

Optional

Not applicable

Rules

Not applicable


Data carrier specification

Carrier choices

Symbols from the EAN/UPC symbology family (UPC-A, UPC-E, may be used to encode the GTIN-12, EAN-13 to encode the GTIN-13 and, if the size requirements are met, EAN-8 to encode the GTIN-8 of the trade item that is a single product).

ITF-14 symbols may be used where printing conditions require the application of a less demanding symbology. ITF-14 symbols can encode the GTIN-12, or GTIN-13 of the item.

A GS1-128 barcode or GS1 DataBar barcode (*) with Application Identifier (01) may be used to encode a GTIN that identifies the trade item if the printing conditions allow. The choice of one of these symbologies is particularly relevant if there is a need to encode attribute information in addition to the identification number.

 **Note:** A GS1 DataBar barcode SHALL NOT be used to encode a GTIN-14 constructed from an ISBN.

(*) In 2014 GS1 DataBar became an open symbology and all scanning environments must be able to read these symbols.

[For trade items used in manufacturing and maintenance, repair and overhaul \(MRO\) processes the following data carrier choices take precedence over the carrier choices above: GS1-128, GS1 DataMatrix, GS1 QR Code and EPC/RFID.](#)

For healthcare, the following carrier selections take precedence over the carrier choices above and apply to all regulated healthcare retail consumer trade items.

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Figure 2.1.2.6.1-3. Healthcare carrier choices

<p>Preferred option(s) (this is the long-term direction for AIDC marking)</p>	<p>First preference: GS1-128 symbology. After Jan 2010, GS1 DataBar is permitted for use on all trade items and therefore may be encountered in general distribution however use of GS1-128 is preferred as the scanners in the field today pervasively support it.</p> <p>Second preference: When one linear symbol cannot accommodate the field length of the data (exceeds 48 characters), two symbols should be used.</p> <p>Third option: Where the package or label size does not permit the use of the first two options, GS1 DataMatrix symbology are permitted but should be avoided wherever possible if the package could be scanned by a mounted conveyerised scanner.</p>
<p>Option in addition to the barcode</p>	<p>See the "data carrier specification carrier choices" recommendations on options in addition to the barcode at the end of section 2.1.2.4</p>
<p>Other acceptable options (GS1 strongly supports existing options for symbol marking as a guiding principle and therefore supports all previous AIDC marking specifications)</p>	<p>See the "data carrier specification carrier choices" recommendations on other acceptable options found at the end of section 2.1.2.4</p>

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Symbol X-dimensions, minimum symbol height, and minimum symbol quality

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For multi-sector use except for retail or regulated healthcare trade items see section [5.5.2.7.2](#), GS1 system symbol specification table 2.

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For regulated healthcare non-retail consumer trade items see section [5.5.2.7.8](#), GS1 system symbol specification table 8.

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[For manufacturing and MRO processes see 5.5.2.7.4 GS1 system symbol specification table 4.](#)

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Symbol placement

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All the symbol placement guidelines defined in section 6.

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Unique application processing requirements

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For a description of processing requirements, see section 7.

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2.1.2.6.2 Trade item groupings of identical trade items

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Application description

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A trade item grouping that is a pre-defined grouping of identical trade items. The manufacturer or supplier has the option of either assigning a unique GTIN-13 or GTIN-12 to each trade item grouping or assigning a unique GTIN-14. These 14-digit GTINs incorporate the GTIN (less its check digit) of the trade item contained in each grouping. The check digit for each GTIN-14 is then recalculated.

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The indicators have no meaning. The digits do not have to be used in sequential order, and some may not be used at all. The GTIN-14 structure for trade item groupings creates extra numbering capacity. Indicators can be re-used.

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Figure 2.1.2.6.2-1. GTIN-14 data structures

		Global Trade Item Number (GTIN)												
		Indicator	GTIN of contained trade items (without check digit)											Check digit
GTIN-8 based	N ₁	0	0	0	0	0	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄
GTIN-12 based	N ₁	0	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄
GTIN-13 based	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄

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The indicator is a digit with a value of 1 to 8. It is assigned as required by the company that constructs the identification number. It can provide up to eight separate GTIN-14s to identify trade item groupings.

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For packaging configuration hierarchies which include a retail consumer trade item identified with a GTIN-13, GTIN-12, or GTIN-8, this GTIN must always be one of the relevant levels of packaging contained, usually the lowest level (see note below related to GTIN-14 assignment on the primary packaging). Restricted Circulation Numbers must not be used in this element string.

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 **Note:** regulated healthcare trade items on the primary packaging, the phrase “usually the lowest level” SHALL be interpreted as allowing for the use of GTIN-14 on packaging configurations below the retail consumer trade item level, if one exists. This interpretation may not be applied to other trade item categories such as Do It Yourself (DIY) or Foodservice.

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Any product package which will encounter scanning or product listing for sale at point-of-sale SHALL be identified according to retail point-of-sale specifications.

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When a GTIN change at the retail consumer trade item level is required, the GTIN change must be made at all configuration levels above the retail consumer trade item level. Where there is an association between primary packaging and retail consumer trade item levels and GTIN -14 assignment is used on the primary packaging, the GTIN-14 assigned to the primary packaging is based on the retail level GTIN. There are three scenarios to consider for the relationship of these GTIN assignments:

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- If changes to the primary packaging drive the change of the GTIN assigned to the retail consumer trade item level, the GTIN of the primary packaging will change.

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- If changes to retail consumer trade item level GTIN are not caused by a change in primary packaging, the GTIN at the primary package level may or may not change per the discretion of the brand owner.

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- If additional retail level package(s) are introduced beyond the original retail package or replace the original retail package, the GTIN-14 on the primary packing may remain tied to the original retail level GTIN.

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The check digit is explained in section 7.9. Its verification, usually carried out automatically by the barcode reader, ensures that the number is correctly composed.



Figure 2.1.2.6.2-2. Different groupings of the same trade item

Indicator	GTIN of trade item contained in the grouping, less its check digit	New check digit	Description	Quantity
	061414112345	2	Trade item	Single
1	061414112345	9	Trade item grouping	A grouping
...
8	061414112345	8	Trade item grouping	Another grouping

Indicators 1 to 8 may be used to create new GTIN-14s. When these eight indicators have been used, further groupings must be identified with either a GTIN-13 or GTIN-12. (Indicator digit 9 is reserved for variable measure trade items). (See section [2.1.5](#)).

GS1 key

Definition

- The GTIN-8 is the 8-digit GS1 identification key composed of a GS1-8 Prefix, item reference, and check digit used to identify trade items
- The GTIN-12 is the 12-digit GS1 identification key composed of a U.P.C. Company Prefix, item reference, and check digit used to identify trade items.
- The GTIN-13 is the 13-digit GS1 identification key composed of a GS1 Company Prefix, item reference, and check digit used to identify trade items.
- The GTIN-14 is the 14-digit GS1 identification key composed of an indicator digit (1-9), GS1 Company Prefix, item reference, and check digit used to identify trade items.

Rules

All the GTIN Allocation Rules described in section 4.

Attributes

Required


For regulated healthcare consumer trade items the following levels of AIDC marking are specified:

Figure 2.1.2.6.2-3. Required attributes

AIDC marking level for regulated healthcare trade items	Key	Batch/lot number - AI (10)	Expiration date - AI (17)	Serial number - AI (21)	Other
Minimum	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	Yes	Yes	No	None
Enhanced	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	Yes	Yes	No	None
Highest – Brand owner AIDC marking	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	Yes	Yes	Yes	Potency AI (7004) for pharmaceutical, and for medical device kits with pharmaceutical (cases only for both situations)
Highest – Hospital AIDC marking of pharmaceutical	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	No	AI (7003) for short-life products	Yes	None
Hospital AIDC marking of medical devices	No	No	No	No	None

To manage healthcare data requirements within EPC/RFID tags, see section [3.11](#) and the most recent version of the *EPC Tag Data Standard*.



199	Optional
200	Not applicable
201	Rules
202	Not applicable
203	Data carrier specification
204	Carrier choices
205	For multi-sector use except for regulated healthcare retail consumer trade items symbols from the
206	EAN/UPC symbology family (UPC-A, UPC-E, and EAN-13) may be used to encode the GTIN-12 or
207	GTIN-13 of the trade item grouping. If used, the GTIN-8 is encoded in an EAN-8 barcode. GTIN-8
208	can only be used when all other pack size constraints are met, see section 2.1.2.1.4 . The system
209	recognises this element string by the symbology identifier JE0 .
210	ITF-14 symbols may be used on trade item groupings where printing conditions require the
211	application of a less demanding symbology. ITF-14 symbols can encode the GTIN-12, GTIN-13, or
212	GTIN-14 of the item. The system recognises this element string by the symbology identifier JI1 and
213	the number of digits decoded (14).
214	A GS1-128 barcode or GS1 DataBar barcode (*) with Application Identifier (01) may be used to
215	encode a GTIN-12, GTIN-13, or GTIN-14 that identifies the trade item if the printing conditions
216	allow. The choice of one of these symbologies is particularly relevant if there is a need to encode
217	attribute information in addition to the identification number. The system recognises this element
218	string by the symbology identifier (JC1 for GS-128, Je0 for GS1 DataBar) and the Application
219	Identifier.
220	 Note: A GS1 DataBar barcode SHALL NOT be used to encode a GTIN-14 constructed from an
221	ISBN.
222	(*) In 2014 GS1 DataBar became an open symbology and all scanning environments must be able
223	to read these symbols.
224	For trade items used in manufacturing and maintenance, repair and overhaul (MRO) processes the
225	following data carrier choices take precedence over the carrier choices above: GS1-128, GS1
226	DataMatrix, GS1 QR Code and EPC/RFID.
227	For healthcare the carrier selections noted at the end of section 2.1.2.6.1 take precedence over the
228	carrier choices above and apply to all regulated healthcare retail consumer trade items.
229	Symbol X-dimensions, minimum symbol height, and minimum symbol quality
230	For multi-sector use other than regulated healthcare trade items see section 5.5.2.7.2 , GS1 system
231	symbol specification table 2.
232	For regulated healthcare non-retail consumer trade items see section 5.5.2.7.8 , GS1 system symbol
233	specification table 8.
234	For manufacturing and MRO processes see 5.5.2.7.4 GS1 system symbol specification table 4.
235	Symbol placement
236	All the symbol placement guidelines defined in section 6.
237	Unique application processing requirements
238	For a description of processing requirements, see section 7.
239	2.1.2.6.3 Trade item Groupings of mixed trade items
240	Application description
241	A trade item grouping that is a pre-defined grouping of two or more different trade items.
242	For example:



- Product C is a grouping of Product A (GTIN 'A') and Product B (GTIN 'B'), and is identified with either a GTIN-12 or GTIN-13, GTIN 'C.'
- GTIN 'C' could then be used to construct a GTIN-14 for a trade item grouping comprised of Product C.

As shown in figure 2.1.2.6.3-1, the GTIN-12s 614141234561 and 614141345670 identify the two trade items in the assortment identified by the GTIN 614141456789.

Figure 2.1.2.6.3-1. Example of trade item grouping of mixed trade items

Indicator	GTIN of trade item less its check digit	Check digit	Description	Quantity
	061414123456 061414134567	1 0	Retail consumer trade item (Product A) Retail consumer trade item (Product B)	Single Single
	061414145678	9	Retail consumer trade item (Product C)	Assortment
1	061414145678	6	Trade item grouping	A grouping of the assortment
...
8	061414145678	5	Trade item grouping	Another grouping of the assortment

The indicators 1 to 8 may be used to create new GTIN-14s. When these eight indicators have been used, further groupings must be identified with either a GTIN-13 or GTIN-12. (Indicator digit 9 is reserved for variable measure trade items). (See section 2.1.5).

GS1 key

Definition

- The GTIN-12 is the 12-digit GS1 identification key composed of a U.P.C. Company Prefix, item reference, and check digit used to identify trade items.
- The GTIN-13 is the 13-digit GS1 identification key composed of a GS1 Company Prefix, item reference, and check digit used to identify trade items.
- The GTIN-14 is the 14-digit GS1 identification key composed of an indicator digit (1-9), GS1 Company Prefix, item reference, and check digit used to identify trade items

Rules

All the GTIN Allocation Rules described in section 4; in addition, the GTIN-14 is valid for trade item groupings only when the trade item contained is a mixed assortment of two or more different trade items.

Attributes

Required

Not applicable

Optional

Not applicable

Data carrier specification

Carrier choices

Symbols from the EAN/UPC symbology family (UPC-A, UPC-E, and EAN-13) may be used to encode the GTIN-12 or GTIN-13 of the trade item grouping. The system recognises this element string by the symbology identifier **JE0**.

ITF-14 symbols may be used on trade item groupings where printing conditions require the application of a less demanding symbology. ITF-14 symbols can encode the GTIN-12, GTIN-13, or


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274 GTIN-14 of the item. The system recognises this element string by the symbology identifier **J11** and
275 the number of digits decoded (14).

276 A GS1-128 barcode or GS1 DataBar barcode (*) with Application Identifier (01) may be used to
277 encode a GTIN-12, GTIN-13, or GTIN-14 that identifies the trade item if the printing conditions
278 allow. The choice of one of these symbologies is particularly relevant if there is a need to encode
279 attribute information in addition to the identification number. The system recognises this element
280 string by the symbology identifier **JC1** for GS1-128, **Je0** for GS1 DataBar) and the Application
281 Identifier.

282  **Note:** A GS1 DataBar barcode SHALL NOT be used to encode a GTIN-14 constructed from an
283 ISBN.

284 (*) In 2014 GS1 DataBar became an open symbology and all scanning environments must be able
285 to read these symbols.

286 [For trade items used in manufacturing and maintenance, repair and overhaul \(MRO\) processes the
287 following data carrier choices take precedence over the carrier choices above: GS1-128, GS1
288 DataMatrix, GS1 QR Code and EPC/RFID.](#)

289 For healthcare, the carrier selections noted at the end of section [2.1.2.6.1](#) take precedence over the
290 Carrier Choices above and apply to all regulated healthcare retail consumer trade items.

291 **Symbol X-dimensions, minimum symbol height, and minimum symbol quality**

292 For multi-sector use other than regulated healthcare trade items see section [5.5.2.7.2](#) GS1 system
293 symbol specification table 2.

294 For regulated healthcare non-retail consumer trade items see section [5.5.2.7.8](#), GS1 system symbol
295 specification table 8.

296 [For manufacturing and MRO processes see 5.5.2.7.4 GS1 system symbol specification table 4.](#)

297 **Symbol placement**

298 All the symbol placement guidelines defined in section 6.

299 **Unique application processing requirements**

300 For a description of processing requirements, see section 7.

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302 **2.1.4 Direct part marking**


303 **Application description**

304 [Direct marking is the process of applying a permanent mark to the trade item, in order for it to be
305 identified during its full lifetime independent of its packaging.](#)

306 [Three methods exist for the direct marking of trade items:](#)

- 307 [1. Direct part marking \(DPM\): The process of marking a symbol directly onto an item using an
308 intrusive or non-intrusive method instead of applying a label or using another indirect marking
309 process.](#)
- 310 [2. Durable labelling: The process of marking a symbol onto a label that is intended to permanently
311 stay on the trade item.](#)
- 312 [3. Durable RFID-tagging: The process of applying an RFID-tag that is intended to permanently stay
313 on the trade item.](#)

314 ~~Direct part marking (DPM) refers to the process of marking a symbol directly onto an item using an
315 intrusive or non-intrusive method instead of applying a label or using another indirect marking
316 process.~~

Commented [CJ1]:  Gen Specs PUBS team: please ensure that all references to this section are updated as well



GS1 key

Definition

- The GTIN-12 is the 12-digit GS1 identification key composed of a U.P.C. Company Prefix, item reference, and check digit used to identify trade items.
- The GTIN-13 is the 13-digit GS1 identification key composed of a GS1 Company Prefix, item reference, and check digit used to identify trade items.
- The GTIN-14 is the 14-digit GS1 identification key composed of an indicator digit (1-9), GS1 Company Prefix, item reference, and check digit used to identify trade items.
- The GRAI is the GS1 identification key used to identify returnable assets. The key is comprised of a GS1 Company Prefix, asset type, check digit, and optional serial number.
- The GIAI is the GS1 identification key used to identify an individual asset. The key is comprised of a GS1 Company Prefix and an Individual Asset Reference.

Rules

GTIN Allocation rules are described in section 4.

Attributes

Required

For regulated healthcare consumer trade items the following levels of AIDC marking are specified:

Figure 2.1.4-1. AIDC marking levels for regulated healthcare consumer trade items

AIDC marking level for regulated healthcare trade items	Key	Batch/lot number - AI (10)	Expiration date - AI (17)	Serial number - AI (21)	Other
Highest – Brand owner AIDC marking of certain medical devices	GTIN-12, GTIN-13, or GTIN-14	No	No	Yes	None
Highest - Hospital AIDC marking of certain medical devices (see section 2.1.1.8)	GRAI, AI (8003), or GIAI, AI (8004), is optional if GTIN, AI (01), + serial number, AI (21), is not marked on the product.	No	No	GRAI, AI (8003), or GIAI, AI (8004), is optional if GTIN, AI (01), + serial number, AI (21), is not marked on the product.	

To manage healthcare data requirements within EPC/RFID tags, see section 3.11 and the most recent version of the *EPC Tag Data Standard*.

Optional

See section 3 for all the Application Identifiers (AIs) that can be used with a GTIN. Since the GTIN identifies a grouping of items, the optional attributes apply to the grouping as well.

Rules

All the GTIN Allocation Rules described in section 4.

Data carrier specification

Carrier choices

- [GS1 DataMatrix.](#)
- [GS1 QR Code.](#)
- [EPC/RFID.](#)

For healthcare, the following carrier selection applies to regulated healthcare retail consumer trade items.

Figure 2.1.4-2. Carrier choices for regulated healthcare retail consumer trade items

<u>Preferred option</u>	<u>GS1 DataMatrix symbology</u>
<u>Option in addition to the barcode</u>	<u>See the "Data carrier specification carrier choices" recommendations on options in addition to the barcode at the end of section 2.1.2.4 2.1.2.4</u>

Figure 2.1.4-3. Example of GS1 DataMatrix symbol encoded with GTIN and AIs (17) and (10) per section 2.1.2.4 2.1.2.4

(17) 050101 (10) ABC123



(01) 04012345678901

Figure 2.1.4-4. Example of GS1 DataMatrix symbol encoded with GTIN and serial number AI (21)

(21) ABCDEFG123456789



(01) 04012345678901

Symbol X-dimensions, minimum symbol height, and minimum symbol quality

Direct part marking:

The use of GS1 DataMatrix and GS1 QR Code in direct part marking applications is endorsed by GS1 for those applications that require permanent marking for cradle-to-grave history of the part's lifecycle. For regulated healthcare trade items including medical devices, GS1 DataMatrix is the only GS1 data carrier approved for direct part marking application.

Some sources express the height of the 2D cell in terms of a Y dimension. For GS1 DataMatrix and GS1 QR Code the cells are considered the same size under optimal print conditions so that X = Y.

Symbol size is determined by the amount of data and the number of rows and columns required encoding the data for the X-dimensions selected (see figures 5.7.3.2-1 and 5.7.3.2-2).

Consult GS1 system symbol specification table 7: 2D Symbols Using GS1 DataMatrix or GS1 QR Code, section 5.5.2.7.7, for minimum and maximum X-dimensions and other sizing requirements.

Durable labelling:

See section 5.5.2.7.7 5.2.7.4, GS1 system symbol specification table 47

Symbol X-dimensions, minimum symbol height, and minimum symbol quality

Field Code Changed

See section ~~5.5.2.7.7, GS1 system symbol specification table 7~~

Symbol size is determined by the amount of data and the number of rows and columns required encoding the data for the X dimensions selected (see figures 5.7.3.2.1 and 5.7.3.2.2). For healthcare, the following carrier selection applies to regulated healthcare retail consumer trade items:

~~Figure 2.1.4.2. Carrier choices for regulated healthcare retail consumer trade items~~

Preferred option	GS1 DataMatrix symbology
Option in addition to the barcode	See the "Data carrier specification carrier choices" recommendations on options in addition to the barcode at the end of section 2.1.2.4

~~Figure 2.1.4.3. Example of GS1 DataMatrix symbol encoded with GTIN and AIs (17) and (10) per section 2.1.2.4~~

(17) 050101 (10) ABC123



(01) 04012345678901

~~Figure 2.1.4.4. Example of GS1 DataMatrix symbol encoded with GTIN and serial number AI (21)~~

(21) ABCDEFG123456789



(01) 04012345678901

Symbol placement

General principles on placement of barcodes are described in section 6.

The majority of uses for these symbols will be on very small items with curved surfaces such as vials, ampoules, and very small bottles. For guidance in locating these symbols on curved surfaces, refer to section [6.2](#).

Unique application processing requirements for direct part marking

Use GS1 DataMatrix or GS1 QR Code if:

- The use of GS1 DataMatrix or GS1 QR Code is allowed in the application specification.
- The marking method will not produce an acceptable linear symbol but will produce an acceptable GS1 DataMatrix or GS1 QR Code (e.g., dot peen marking and high-speed ink jet).
- A GS1 identification key plus attribute element string are to be encoded.
- GS1 DataMatrix or GS1 QR Code is the only symbology that will fit on the item at the application specified X-dimension.
- Low contrast signal is expected from the application.



- 403 ■ The use of 2D (two-dimensional) array scanners and/or vision systems are specified exclusively
- 404 for the application and can read GS1 DataMatrix and GS1 QR Code.

405 **Marking methods**

406 It is important to analyse the selected method of marking in relation to several considerations:

- 407 ■ Finishes that cause an excess of shadowing or glare.
- 408 ■ Surfaces that do not provide sufficient contrast - less than 20 percent difference in surface
- 409 reflectance.
- 410 ■ Safety critical parts that cannot be marked with intrusive methods.
- 411 ■ Marking method must comply with the users' requirements.
- 412 ■ Location of the symbol should not be:
 - 413 □ In direct air/water (streams, etc.).
 - 414 □ On sealing surfaces.
 - 415 □ On surfaces subject to wear or exposure to heavy contact.

416 **Intrusive (subtractive methods)**

417 Intrusive marking refers to methods that remove or alter the material of the host.

- 418 ■ Abrasive blast.
- 419 ■ Dot peen.
- 420 ■ Electro-chemical marking, colouring, or etching.
- 421 ■ Engraving/milling.
- 422 ■ Fabric embroidery/weaving.
- 423 ■ Direct laser marking.
- 424 ■ Laser shot peening.
- 425 ■ Laser Inducted Surface Improvement (LISI).
- 426 ■ Gas Assisted Laser Etch (GALE).
- 427 ■ Laser Induced Vapour Deposition (LIVD).

428 **Non-intrusive (additive methods)**

429 Non-Intrusive marking does not affect the host material; it usually involves the addition of material.

- 430 ■ Cast, forge, mold.
- 431 ■ Inkjet
- 432 ■ Laser bonding.
- 433 ■ Liquid metal jet.
- 434 ■ Silk screen.
- 435 ■ Stencil

436 **Host (substrate) surface**

437 Direct part marking of GS1 DataMatrix or GS1 QR Code SHOULD be reserved for surfaces no

438 rougher than 250 micro inches (millionths of an inch) and for surfaces that are no smoother than 8

439 micro inches. Surfaces that fall outside these parameters need to be re-surfaced or marked using an

440 alternative method.

441 Consideration of the surface colour must be taken. A minimum 20 percent difference in contrast

442 between the host and the symbol is required. Altering the cell size in relation to the surface

443 roughness should provide adequate contrast on cast surfaces.

444 (Cell size = (0.00006 X roughness) + 0.0067); (see figure 2.1.4-5)



445

Figure 2.1.4-5. Cell size in relation to surface roughness

Average roughness	Cell size minimum
0,508 micrometres (20 micro inches)	0.1905 mm (0.0075 in.)
1,524 micrometres (60 micro inches)	0.2286 mm (0.009 in.)
3,048 micrometres (120 micro inches)	0.381 mm (0.015 in.)
5,08 micrometres (200 micro inches)	0.508 mm (0.020 in.)
7,62 micrometres (300 micro inches)	0.635 mm (0.025 in.)
10,668 micrometres (420 micro inches)	0.762 mm (0.030 in.)

446

Substrate surface thickness

447

A minimum host surface thickness is recommended as is a maximum marking depth. Both are outlined in the table below.

448

449

Figure 2.1.4-6. Marking depth and surface thickness by method

Method	Min. thickness	Max marking depth
Dot Peen	1.016 mm (0.04 in.)	0.102 mm (0.004 in.)
Laser Shot peening	0.508 mm (0.020 in.)	0.051 mm (0.002 in.)
Laser Bonding	0.025 mm (0.001 in.)	Surface Mark
Abrasive Blast	0.076 mm (0.003 in.)	0.008 mm (0.0003 in.)
Electro-Chemical Colouring	0.508 mm (0.02 in.)	0.051 mm (0.002 in.)
Laser Etch	0.762 mm (0.03 in.)	0.076 mm (0.003 in.)
LISI	1.016 mm (0.04 in.)	0.102 mm (0.004 in.)
Laser Engraving	1.27 mm (0.05 in.)	0.127 mm (0.005 in.)
Electro-Chemical Etch	2.54 mm (0.100 in.)	0.254 mm (0.01 in.)
Micro-Milling	31.75 mm (1.250 in.)	3.175 mm (0.125 in.)

450

Human readable interpretation

451

For human readable interpretation rules see section 4.14. For HRI rules specific to regulated healthcare retail consumer trade items, see section 4.14.1.

452

453

2.7 Summary of applications and operative scanning environments for GS1 system symbols

454

455

The figure below provides a cross-reference for all system applications defined in section 2 and the GS1 symbol specification tables (SSTs) in section 5. The application where the barcode will be used SHALL be determined prior to locating the correct symbol specification table (SST) entry. Use the "See SST(s) #" column to find the SST appropriate for the application area. Because most application areas provide a reference to two symbol specification tables based on the operative scanning environment, a decision must be made between the two. See the decision tree figure 5.5.2.6.1 - 2 to determine the correct symbol specification table.

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Figure 2.7-1. Areas of GS1 system application

Application	See section	See SST(s) #	Carrier choices
Trade items intended for general distribution scanning only	2.1.2.6	2	EAN/UPC, ITF-14, GS1-128, GS1 DataBar
<ul style="list-style-type: none"> Trade items intended for general distribution scanning only – regulated healthcare trade items 	2.1.2.6	8	GS1-128, GS1 DataBar, GS1 DataMatrix, EAN/UPC, ITF-14
<ul style="list-style-type: none"> Trade items intended for distribution scanning in manufacturing, maintenance, repair and overhaul processes. 	2.1.2.6	4	GS1-128 , GS1 DataMatrix , GS1 QR Code
Direct-part marking	2.1.4	4.7	GS1 DataMatrix, GS1 QR Code

462




463


464 2.3 Assets

465 The GS1 system provides a method for the identification of assets. The object of asset identification
466 is to identify a physical entity as an inventory item. Each company holding a GS1 Company Prefix
467 may assign asset identifiers to the assets or trade items supplied to their customers.

468 Each company holding a GS1 Company Prefix may assign a Global Returnable Asset Identifier
469 (GRAI) or Global Individual Asset Identifier (GIAI). If the asset is manufactured on behalf of a
470 company best practice may dictate that the manufacturing company applies the GRAI or GIAI during
471 the manufacturing process on behalf of this customer.

472  **Note:** Where assets of the same type need to be ordered a GTIN is required for the ordering
473 process. There is no conflict when a GTIN and a GRAI (GS1 Company Prefix, asset type and
474 check digit) have the same digits, because the data carrier (EDI qualifier, GS1 barcode with
475 GS1 Application Identifier, or EPC/RFID) will distinguish between the two GS1 identification
476 keys.

477 The GS1 ~~system~~ asset identifiers act as keys to access the characteristics of an asset stored in a
478 computer file and/or to record movements of assets.

479  **Note:** [The attributes of the asset should be recorded and shared digitally using the GS1 asset
480 identifier as the key to the information. Examples of the type of information held include the
481 party who owns the asset, the value of the asset, the location of the asset, and the life-cycle
482 history of the asset.](#)

483 Asset identifiers may be used for applications, such as the location and usership of a given asset
484 (e.g., a personal computer or returnable transport item) or for complex applications, such as
485 recording the characteristics of a returnable asset (e.g., a reusable beer keg), its movements, its
486 life-cycle history, and any relevant data for accounting purposes.


487 2.3.1 Global Returnable Asset Identifier (GRAI): AI (8003)

488 Application description

489 A returnable asset is a reusable package or transport equipment of a certain value, such as a beer
490 keg, a gas cylinder, a plastic pallet, or a crate. The GS1 system identification of a returnable asset,
491 the Global Returnable Asset Identifier (GRAI), enables tracking as well as recording of all relevant
492 data.

493 The element string comprises the GRAI. The GRAI is composed of the GS1 Company Prefix of the
494 company assigning the asset identifier and of the asset type. The latter is assigned to uniquely
495 identify, together with the GS1 Company Prefix, a particular kind of asset. The GRAI remains the
496 same for all identical Returnable Assets. Although consecutive numbering is recommended, the
497 structure is left to the discretion of the assigning company. An optional serial component may be
498 used to distinguish Individual Assets within a given asset type.

499 A typical application using this element string is in tracking returnable beer kegs. The owner of the
500 beer keg applies a barcode carrying a GRAI to the keg using a permanent marking technique. This
501 barcode is scanned whenever the keg is supplied full to a customer and scanned again when it is
502 returned. This scanning operation allows the beer keg owner to automatically capture the life-cycle
503 history of a given keg and to operate a deposit system, if desired.

504  **Note:** This element string identifies a physical entity as a returnable asset. When such a
505 physical entity is used to transport or to contain a trade item, the element string AI (8003)
506 must never be used to identify the transported or contained trade item.



GS1 refers to GRAI in the section [2.1.1.9](#), which deals with medical devices for the Automatic Identification and Data Capture (AIDC) management of these items within the micro-logistics cycle of use, cleaning and sterilisation. See section [2.1.1.9](#) for more details.

GS1 key

Definition

The [Global Returnable Asset Identifier \(GRAI\)](#) is the GS1 identification key used to identify returnable assets. The key is comprised of a GS1 Company Prefix, a [Asset Type](#), check digit, and optional serial component.

The structure of the element string for a [Global Returnable Asset Identifier \(GRAI\)](#) can include two parts: the mandatory [Asset Type](#) identification and an optional serial component.

[The Application Identifier to indicate the Global Returnable Asset Identifier \(GRAI\) is AI \(8003\)](#)

[See section 3.2, Global Returnable Asset Identifier \(GRAI\): AI \(8003\).](#)

~~[\(see section 3.2 for the list of GS1 Application Identifiers\).](#)~~

Rules

See section 4, Application rules.

Attributes

~~The attributes of the asset should be established on a computer file using the GS1 system asset identifier as the key to the information. Examples of the type of information held include the full name and address of the party who owns the asset, the value of the asset, the location of the asset, and the life cycle history of the asset.~~

Required

Not applicable.

Optional

~~The owner of the asset assigns the optional serial component. It denotes an individual asset within a given asset type. The field is alphanumeric and is used to distinguish individual assets with the same asset types. Not applicable.~~

~~[See section 3.2, Global Returnable Asset Identifier \(GRAI\): AI \(8003\).](#)~~

Rules

See section 4, Application rules.

Data carrier specification

Carrier choices

The GS1 data carriers that can be used to represent the GRAI are:

- GS1-128.
- GS1 DataMatrix.
- GS1 QR Code.
- EPC/RFID.

When encoding an asset identifier for medical devices see section [2.1.1.9](#).

[When applying direct part marking, also see the information in section 2.1.4.](#)

Symbol X-dimension, minimum symbol height, and minimum symbol quality

For GS1-128, GS1 DataMatrix and GS1 QR Code, see section [5.5.2.7.9](#) GS1 system symbol specification table 9 ~~and section 5.5.2.7.7 GS1 system symbol specification table 7 (direct part marking).~~

Field Code Changed

Symbol placement

Not applicable.

Unique application processing requirements

For a description of processing requirements, see section 7.

2.3.2 Global Individual Asset Identifier (GIAI): AI (8004)

Application description

In the GS1 system, an Individual Asset is considered a physical entity made up of any characteristics.

This element string identifies a particular physical entity as an asset. It must not be used for other purposes and must be unique for a period well beyond the lifetime of the relevant asset records. Whether or not, the assigned Global Individual Asset Identifier (GIAI) may remain with the *physical itemasset* when changing hands depends on the particular business application. If it remains with the *assetphysical-item*, then it **SHALL** never be re-used.

The GIAI comprises the GS1 Company Prefix of the company assigning the asset identifier and an *individual aAsset rReference* (see section 3). The *individual aAsset rReference* is alphanumeric. Its structure is left to the discretion of the *asset owner or managercompany-applying-the-element string*.

This element string might, for example, be used to record the life-cycle history of aircraft parts. By symbol marking the GIAI, AI (8004), on a given part, aircraft operators are able to automatically update their inventory database and track assets from acquisition until retirement.

GS1 refers to GIAI in the section [2.1.1.9](#), which deals with Automatic Identification and Data Capture (AIDC) for medical devices within the micro-logistics cycle of use, cleaning and sterilisation. See section [2.1.1.9](#) for more details.

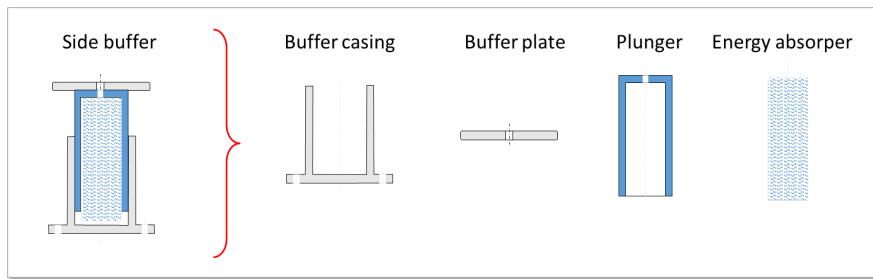
GS1 key

Definition

The *Global Individual Asset Identifier (GIAI)* is the GS1 identification key used to identify an individual asset. The key is comprised of a GS1 Company Prefix and an individual asset reference. [The Application Identifier to indicate the Global Individual Asset Identifier \(GIAI\) is AI \(8004\)](#)

Note: The GIAI of assemblies (composite components) may need to be marked on a component of the assembly (the so called *leading part*) when there is no dedicated space to mark the GIAI on the assembly itself. For example, the GIAI of a *side buffer* of a rail vehicle may be included in a separate marking on the *buffer casing*, in addition to the marking of the *buffer casing* itself. To be able to recognise the marking of the assembly AI (7023) **SHALL** be used to indicate the GIAI of the assembly.

Figure 2.3.2-1. Example: Side buffer (assembly) with buffer casing (leading part)



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585 ~~S~~(see section [3.2](#) for the list of all GS1 Application Identifiers).

586 **Rules**

587 See section 4, Application rules.

588 **Attributes**

589 ~~The attributes of the asset should be established on a computer file using the GS1 system asset~~
590 ~~identifier as the key to the information. Examples of the type of information held include the~~
591 ~~full name and address of the party who owns the asset, the value of the asset, the location of~~
592 ~~the asset, and the life-cycle history of the asset.~~

593 **Required**

594 ~~Not applicable~~ne is currently standardised.

595 **Optional**

596 ~~Not applicable~~ is currently standardisedapplicable.

597 **Rules**

598 See section 4, Application rules (none is currently identified).

599 **Data carrier specification**

600 **Carrier choices**

601 The GS1 data carriers that can be used to represent the GIAI are:

- 602 ■ GS1-128.
- 603 ■ GS1 DataMatrix.
- 604 ■ GS1 QR Code.
- 605 ■ EPC/RFID.

606 When encoding an asset identifier for medical devices see section [2.1.1.9](#).

607 [When applying direct part marking, also see the information in section 2.1.4.](#)

609 **Symbol X-dimension, minimum symbol height, and minimum symbol quality**

610 For GS1-128, GS1 DataMatrix and GS1 QR Code, see section [5.5.2.7.9](#) GS1 system symbol
611 specification table 9 [and section 5.5.2.7.7](#) GS1 system symbol specification table 7 ([direct part](#)
612 [marking](#)).

613 **Symbol placement**

614 Not applicable

615 **Unique application processing requirements**

616 For a description of processing requirements, see section 7.

617
618

619 **2.4 Locations and parties**

620 **2.4.3 Application overview**

621 **2.4.3.2 Specification of a delivery-physical location**

622 **Application description**

623 The following Application Identifiers enable the specification of a physical location on a label or
 624 document, relative to its role in a business process:

- 625 ■ AI (410) Ship to - Deliver to-
- 626 ■ AI (413) Ship for - Deliver for-
- 627 ■ [AI \(416\) Production or service location](#)

628 **AI (410) Ship to - Deliver to**

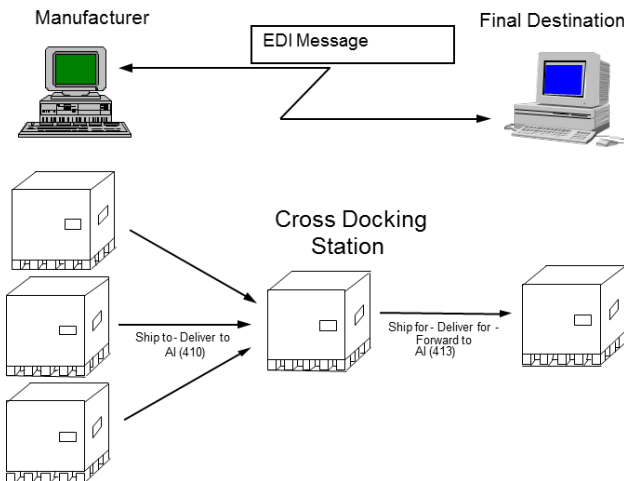
629 An element string with an Application Identifier AI (410) represents the Global Location Number
 630 (GLN) of the recipient of a logistic unit. The GLN refers to the address where a particular transport
 631 unit identified with an SSCC is to be delivered. This element string is used in single leg transport
 632 operations. A logistic unit may include a barcode carrying the GLN of the unit's intended destination.
 633 When scanning this element string, the data transmitted may be used to retrieve the related
 634 address and/or to sort the item by destination.

635 **AI (413) Ship for - Deliver for**

636 An element string with Application Identifier AI (413) is used by the consignee for determining the
 637 internal or subsequent final destination of a physical unit.

638 Cross docking is a typical application using this element string. Here, a barcode carrying the
 639 element string AI (410) is placed on a logistic unit at the point of creation to direct the goods to the
 640 intermediate destination (e.g., a distribution centre). The element string AI (413) is also carried by
 641 the barcode to direct the goods to their final destination (e.g., a retail store served by the
 642 distribution centre).

643 **Figure 2.4.3.2-1.** Example of a cross docking application



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AI (416) GLN of the production or service location

An element string with an Application Identifier AI (416) represents the Global Location Number (GLN) of the production or service location. It may for example be used to specify the location where a trade item or asset was produced or refurbished.

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GS1 key

Definition

The Global Location Number (GLN) is the GS1 identification key used to identify physical locations or parties. The key is comprised of a GS1 Company Prefix, location reference, and check digit.

Rules

All GLN Allocation Rules described in section 4.

Attributes

Required

Not applicable

Optional

Not applicable

Rules

Not applicable

Data carrier specification

If the GLN is carried in a barcode or EPC/RFID tag on a product, the rules for trade item applications apply, see section 2.1.

If the GLN is carried in a barcode on a GS1 logistics label, the rules for logistic unit applications apply, see section 2.2.

Unique application processing requirements

For a description of processing requirements, see section 7.

3

3.2 GS1 Application Identifiers in numerical order

Figure 3.2-1. GS1 Application Identifiers

AI	Data Content	Format (*)	FNC1 required (****)	Data title
00	Serial Shipping Container Code (SSCC)	N2+N18		SSCC
01	Global Trade Item Number (GTIN)	N2+N14		GTIN
02	GTIN of contained trade items	N2+N14		CONTENT
10	Batch or lot number	N2+X..20	(FNC1)	BATCH/LOT
11 (**)	Production date (YYMMDD)	N2+N6		PROD DATE
12 (**)	Due date (YYMMDD)	N2+N6		DUE DATE
13 (**)	Packaging date (YYMMDD)	N2+N6		PACK DATE
15 (**)	Best before date (YYMMDD)	N2+N6		BEST BEFORE or BEST BY



AI	Data Content	Format (*)	FNC1 required (****)	Data title
16 (**)	Sell by date (YYMMDD)	N2+N6		SELL BY
17 (**)	Expiration date (YYMMDD)	N2+N6		USE BY OR EXPIRY
20	Variant number	N2+N2		VARIANT
21	Serial number	N2+X..20	(FNC1)	SERIAL
240	Additional item identification	N3+X..30	(FNC1)	ADDITIONAL ID
241	Customer part number	N3+X..30	(FNC1)	CUST. PART NO.
242	Made-to-Order variation number	N3+N..6	(FNC1)	MTO VARIANT
243	Packaging component number	N3+X..20	(FNC1)	PCN
250	Secondary serial number	N3+X..30	(FNC1)	SECONDARY SERIAL
251	Reference to source entity	N3+X..30	(FNC1)	REF. TO SOURCE
253	Global Document Type Identifier (GDTI)	N3+N13+X..17	(FNC1)	GDTI
254	GLN extension component	N3+X..20	(FNC1)	GLN EXTENSION COMPONENT
255	Global Coupon Number (GCN)	N3+N13+N..12	(FNC1)	GCN
30	Count of items (variable measure trade item)	N2+N..8	(FNC1)	VAR. COUNT
310 (***)	Net weight, kilograms (variable measure trade item)	N4+N6		NET WEIGHT (kg)
311 (***)	Length or first dimension, metres (variable measure trade item)	N4+N6		LENGTH (m)
312 (***)	Width, diameter, or second dimension, metres (variable measure trade item)	N4+N6		WIDTH (m)
313 (***)	Depth, thickness, height, or third dimension, metres (variable measure trade item)	N4+N6		HEIGHT (m)
314 (***)	Area, square metres (variable measure trade item)	N4+N6		AREA (m ²)
315 (***)	Net volume, litres (variable measure trade item)	N4+N6		NET VOLUME (l)
316 (***)	Net volume, cubic metres (variable measure trade item)	N4+N6		NET VOLUME (m ³)
320 (***)	Net weight, pounds (variable measure trade item)	N4+N6		NET WEIGHT (lb)
321 (***)	Length or first dimension, inches (variable measure trade item)	N4+N6		LENGTH (i)
322 (***)	Length or first dimension, feet (variable measure trade item)	N4+N6		LENGTH (f)
323 (***)	Length or first dimension, yards (variable measure trade item)	N4+N6		LENGTH (y)
324 (***)	Width, diameter, or second dimension, inches (variable measure trade item)	N4+N6		WIDTH (i)
325 (***)	Width, diameter, or second dimension, feet (variable measure trade item)	N4+N6		WIDTH (f)
326 (***)	Width, diameter, or second dimension, yards (variable measure trade item)	N4+N6		WIDTH (y)
327 (***)	Depth, thickness, height, or third dimension, inches (variable measure trade item)	N4+N6		HEIGHT (i)



AI	Data Content	Format (*)	FNC1 required (****)	Data title
328 (***)	Depth, thickness, height, or third dimension, feet (variable measure trade item)	N4+N6		HEIGHT (f)
329 (***)	Depth, thickness, height, or third dimension, yards (variable measure trade item)	N4+N6		HEIGHT (y)
330 (***)	Logistic weight, kilograms	N4+N6		GROSS WEIGHT (kg)
331 (***)	Length or first dimension, metres	N4+N6		LENGTH (m), log
332 (***)	Width, diameter, or second dimension, metres	N4+N6		WIDTH (m), log
333 (***)	Depth, thickness, height, or third dimension, metres	N4+N6		HEIGHT (m), log
334 (***)	Area, square metres	N4+N6		AREA (m ²), log
335 (***)	Logistic volume, litres	N4+N6		VOLUME (l), log
336 (***)	Logistic volume, cubic metres	N4+N6		VOLUME (m ³), log
337 (***)	Kilograms per square metre	N4+N6		KG PER m ²
340 (***)	Logistic weight, pounds	N4+N6		GROSS WEIGHT (lb)
341 (***)	Length or first dimension, inches	N4+N6		LENGTH (i), log
342 (***)	Length or first dimension, feet	N4+N6		LENGTH (f), log
343 (***)	Length or first dimension, yards	N4+N6		LENGTH (y), log
344 (***)	Width, diameter, or second dimension, inches	N4+N6		WIDTH (i), log
345 (***)	Width, diameter, or second dimension, feet	N4+N6		WIDTH (f), log
346 (***)	Width, diameter, or second dimension, yard	N4+N6		WIDTH (y), log
347 (***)	Depth, thickness, height, or third dimension, inches	N4+N6		HEIGHT (i), log
348 (***)	Depth, thickness, height, or third dimension, feet	N4+N6		HEIGHT (f), log
349 (***)	Depth, thickness, height, or third dimension, yards	N4+N6		HEIGHT (y), log
350 (***)	Area, square inches (variable measure trade item)	N4+N6		AREA (i ²)
351 (***)	Area, square feet (variable measure trade item)	N4+N6		AREA (f ²)
352 (***)	Area, square yards (variable measure trade item)	N4+N6		AREA (y ²)
353 (***)	Area, square inches	N4+N6		AREA (i ²), log
354 (***)	Area, square feet	N4+N6		AREA (f ²), log



AI	Data Content	Format (*)	FNC1 required (****)	Data title
355 (***)	Area, square yards	N4+N6		AREA (y ²), log
356 (***)	Net weight, troy ounces (variable measure trade item)	N4+N6		NET WEIGHT (t)
357 (***)	Net weight (or volume), ounces (variable measure trade item)	N4+N6		NET VOLUME (oz)
360 (***)	Net volume, quarts (variable measure trade item)	N4+N6		NET VOLUME (q)
361 (***)	Net volume, gallons U.S. (variable measure trade item)	N4+N6		NET VOLUME (g)
362 (***)	Logistic volume, quarts	N4+N6		VOLUME (q), log
363 (***)	Logistic volume, gallons U.S.	N4+N6		VOLUME (g), log
364 (***)	Net volume, cubic inches (variable measure trade item)	N4+N6		VOLUME (i ³)
365 (***)	Net volume, cubic feet (variable measure trade item)	N4+N6		VOLUME (f ³)
366 (***)	Net volume, cubic yards (variable measure trade item)	N4+N6		VOLUME (y ³)
367 (***)	Logistic volume, cubic inches	N4+N6		VOLUME (i ³), log
368 (***)	Logistic volume, cubic feet	N4+N6		VOLUME (f ³), log
369 (***)	Logistic volume, cubic yards	N4+N6		VOLUME (y ³), log
37	Count of trade items	N2+N..8	(FNC1)	COUNT
390 (***)	Applicable amount payable or Coupon value, local currency	N4+N..15	(FNC1)	AMOUNT
391 (***)	Applicable amount payable with ISO currency code	N4+N3+N..15	(FNC1)	AMOUNT
392 (***)	Applicable amount payable, single monetary area (variable measure trade item)	N4+N..15	(FNC1)	PRICE
393 (***)	Applicable amount payable with ISO currency code (variable measure trade item)	N4+N3+N..15	(FNC1)	PRICE
394n (***)	Percentage discount of a coupon	N4+N4	(FNC1)	PRCNT OFF
400	Customer's purchase order number	N3+X..30	(FNC1)	ORDER NUMBER
401	Global Identification Number for Consignment (GINC)	N3+X..30	(FNC1)	GINC
402	Global Shipment Identification Number (GSIN)	N3+N17	(FNC1)	GSIN
403	Routing code	N3+X..30	(FNC1)	ROUTE
410	Ship to - Deliver to Global Location Number	N3+N13		SHIP TO LOC
411	Bill to - Invoice to Global Location Number	N3+N13		BILL TO
412	Purchased from Global Location Number	N3+N13		PURCHASE FROM
413	Ship for - Deliver for - Forward to Global Location Number	N3+N13		SHIP FOR LOC



AI	Data Content	Format (*)	FNC1 required (****)	Data title
414	Identification of a physical location - Global Location Number	N3+N13		LOC No
415	Global Location Number of the invoicing party	N3+N13		PAY TO
416	Global Location Number of the production or service location	N3+N13		PROD/SERV LOC
420	Ship to - Deliver to postal code within a single postal authority	N3+X..20	(FNC1)	SHIP TO POST
421	Ship to - Deliver to postal code with ISO country code	N3+N3+X..9	(FNC1)	SHIP TO POST
422	Country of origin of a trade item	N3+N3	(FNC1)	ORIGIN
423	Country of initial processing	N3+N3+N..12	(FNC1)	COUNTRY - INITIAL PROCESS.
424	Country of processing	N3+N3	(FNC1)	COUNTRY - PROCESS.
425	Country of disassembly	N3+N3+N..12	(FNC1)	COUNTRY - DISASSEMBLY
426	Country covering full process chain	N3+N3	(FNC1)	COUNTRY - FULL PROCESS
427	Country subdivision Of origin	N3+X..3	(FNC1)	ORIGIN SUBDIVISION
7001	NATO Stock Number (NSN)	N4+N13	(FNC1)	NSN
7002	UN/ECE meat carcasses and cuts classification	N4+X..30	(FNC1)	MEAT CUT
7003	Expiration date and time	N4+N10	(FNC1)	EXPIRY TIME
7004	Active potency	N4+N..4	(FNC1)	ACTIVE POTENCY
7005	Catch area	N4+X..12	(FNC1)	CATCH AREA
7006	First freeze date	N4+N6	(FNC1)	FIRST FREEZE DATE
7007	Harvest date	N4+N6..12	(FNC1)	HARVEST DATE
7008	Species for fishery purposes	N4+X..3	(FNC1)	AQUATIC SPECIES
7009	Fishing gear type	N4+X..10	(FNC1)	FISHING GEAR TYPE
7010	Production method	N4+X..2	(FNC1)	PROD METHOD
7020	Refurbishment lot ID	N4+X..20	(FNC1)	REFURB LOT
7021	Functional status	N4+X..20	(FNC1)	FUNC STAT
7022	Revision status	N4+X..20	(FNC1)	REV_STAT
7023	Global Individual Asset Identifier (GIAI) of an assembly	N4+X..30	(FNC1)	GIAI - ASSEMBLY
703s	Number of processor with ISO Country Code	N4+N3+X..27	(FNC1)	PROCESSOR # s
710	National Healthcare Reimbursement Number (NHRN) - Germany PZN	N3+X..20	(FNC1)	NHRN PZN
711	National Healthcare Reimbursement Number (NHRN) - France CIP	N3+X..20	(FNC1)	NHRN CIP
712	National Healthcare Reimbursement Number (NHRN) - Spain CN	N3+X..20	(FNC1)	NHRN CN

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AI	Data Content	Format (*)	FNC1 required (***)	Data title
713	National Healthcare Reimbursement Number (NHRN) – Brasil DRN	N3+X..20	(FNC1)	NHRN DRN
nnn (***)	National Healthcare Reimbursement Number (NHRN) – Country "A" NHRN	N3+X..20	(FNC1)	NHRN xxx
8001	Roll products (width, length, core diameter, direction, splices)	N4+N14	(FNC1)	DIMENSIONS
8002	Cellular mobile telephone identifier	N4+X..20	(FNC1)	CMT No
8003	Global Returnable Asset Identifier (GRAI)	N4+N14+X..16	(FNC1)	GRAI
8004	Global Individual Asset Identifier (GIAI)	N4+X..30	(FNC1)	GIAI
8005	Price per unit of measure	N4+N6	(FNC1)	PRICE PER UNIT
8006	Identification of the components of a trade item	N4+N14+N2+N2	(FNC1)	GCTIN
8007	International Bank Account Number (IBAN)	N4+X..34	(FNC1)	IBAN
8008	Date and time of production	N4+N8+N..4	(FNC1)	PROD TIME
8010	Component / Part Identifier (CPID)	N4 + X..30	(FNC1)	CPID
8011	Component / Part Identifier serial number (CPID SERIAL)	N4 + N..12	(FNC1)	CPID SERIAL
8012	Software version	N4 + X..20	(FNC1)	VERSION
8017	Global Service Relation Number to identify the relationship between an organisation offering services and the provider of services	N4+N18	(FNC1)	GSRN - PROVIDER
8018	Global Service Relation Number to identify the relationship between an organisation offering services and the recipient of services	N4+N18	(FNC1)	GSRN - RECIPIENT
8019	Service Relation Instance Number (SRIN)	N4+N..10	(FNC1)	SRIN
8020	Payment slip reference number	N4+X..25	(FNC1)	REF No
8110	Coupon code identification for use in North America	N4+X..70	(FNC1)	-
8111	Loyalty points of a coupon	N4+N4	(FNC1)	POINTS
8112	Paperless coupon code identification for use in North America	N4+X..70	(FNC1)	-
8200	Extended Packaging URL	N4+X..70	(FNC1)	PRODUCT URL
90	Information mutually agreed between trading partners	N2+X..30	(FNC1)	INTERNAL
91 to 99	Company internal information	N2+X..30	(FNC1)	INTERNAL

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674

NOTES:

(*): The first position indicates the length (number of digits) of the GS1 Application Identifier. The following value refers to the format of the data content. The following convention is applied:

- N numeric digit
- X any character in [Figure 7.11-1](#)
- N3 3 numeric digits, fixed length
- N..3 up to 3 numeric digits
- X..3 up to 3 characters in [Figure 7.11-1](#)

(**): If only year and month are available, DD must be filled with two zeroes.



(***): The fourth digit of this GS1 Application Identifier indicates the implied decimal point position.
 Example:

- 3100 Net weight in kg without a decimal point
- 3102 Net weight in kg with two decimal points

(****): All GS1 Application Identifiers indicated with (FNC1) are defined as of variable length and SHALL be delimited unless this element string is the last one to be encoded in the symbol. The delimiter SHALL be a Function 1 Symbol Character in GS1-128 symbology, GS1 DataBar Expanded Versions and GS1 Composite symbology and SHOULD be a Function 1 Symbol Character in GS1 DataMatrix and GS1 QR Code symbology.

(*****): An example to illustrate future additional NHRNs. If additional NHRN AIs are required, a request for a new NHRN AI SHALL be made through the GS1 GSMP.

675

3.7

3.7.1 GLN of the production or service location: AI (416)

The Application Identifier (416) indicates that the GS1 Application Identifier data field contains the Global Location Number (GLN) of the production or service location.

The GS1 Company Prefix is allocated by GS1 Member Organisations to the company that allocates the GLN (see section 1.4.4).

The structure and content of the location reference is at the discretion of the party that defined the location.

The check digit is explained in section 7.9. Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

Figure 3.7.1-1. Format of the element string

Application Identifier	GS1 Company Prefix	Location reference	Check digit
4 1 6	N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂		N ₁₃

The data transmitted from the barcode reader means that the element string denoting the GLN of production or service location has been captured. This element string SHALL be processed together with the GS1 identification key to which it relates. When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used (see also section 3.2): **PROD/SERV LOC**

692

3.8

3.8.1 Refurbishment lot ID: AI (7020)

GS1 Application Identifier (7020) indicates that the GS1 Application Identifier data field contains a refurbishment lot ID.

Together with the GTIN of the trade item and the GLN of the production or service location, the refurbishment lot ID identifies a batch of items that were remanufactured to the original specifications using a combination of reused, repaired and new parts. It is an alphanumeric, variable length string of up to 20 characters.

700



Figure 3.8.1-1. Format of the element string

Application Identifier	Refurbishment lot ID
7 0 2 0	X ₁ —————variable length—————>X ₂₀

The data transmitted from the barcode reader means that the element string denoting a refurbishment lot ID has been captured. It must be processed together with the GLN of the production / service location and the GTIN of the item to which it is related. When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used (see also section 3.2): **REFURB LOT**

3.8.2 Functional status: AI (7021)

GS1 Application Identifier (7021) indicates that the GS1 Application Identifier data field contains the functional status.

The functional status of the trade item may need to be included by the manufacturer to meet regulatory or commercial requirements. For example requirements related to the type approval, allowing the trade item to be sold in a particular country.

Figure 3.8.2-1. Format of the element string

Application Identifier	Functional status
7 0 2 1	X ₁ —————variable length—————>X ₂₀

The data transmitted from the barcode reader means that the element string denoting a functional status has been captured. As this element string is an attribute of a trade item, it must be processed in combination with the GTIN of the item to which it is related. When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used (see also section 3.2): **FUNC STAT**

3.8.3 Revision status: AI (7022)

GS1 Application Identifier (7022) indicates that the GS1 Application Identifier data field contains the revision status.

The revision status of the trade item may need to be included by the manufacturer to meet regulatory or commercial requirements. For example requirements related to the type approval, allowing the trade item to be sold in a particular country.

Figure 3.8.3-1. Format of the element string

Application Identifier	Revision status
7 0 2 2	X ₁ —————variable length—————>X ₂₀

The data transmitted from the barcode reader means that the element string denoting a revision status has been captured. As this element string is subordinate to the functional status, it must be processed in combination with the functional status and the GTIN of the item to which it is related. When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used (see also section 3.2): **REV STAT**

3.8.4 Global Individual Asset Identifier of an assembly: AI (7023)

GS1 Application Identifier (7023) indicates that the GS1 Application Identifier data field contains the GIAI (Global Individual Asset Identifier) of an assembly.

An additional barcode containing the GIAI of an assembly may need to be marked on a sub-component of the assembly (the so called leading part) in case the assembly does not have a surface that uniquely belongs to the assembly (and not to any of its sub-components). In order to distinguish between the identifier of the sub-component and the identifier of the assembly a separate application identifier is used for the latter. See example in section 2.3.2.

The GS1 Company Prefix (see section 1.4.4) is allocated by GS1 Member Organisations to the company that allocates the GIAI –the asset owner or manager of the individual asset.

The structure and content of the individual asset reference is at the discretion of the asset owner or manager. It may contain all characters listed in figure 7.11-1.

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Figure 3.9.6-1. Format of the element string

Application Identifier	Global Individual Asset Identifier (GIAI) of an assembly	
	GS1 Company Prefix	Individual asset reference
7 0 2 3	N ₁ ... N _i	X _{i+1} ... variable length X _j (i<=30)

The data transmitted from the barcode reader means that the element string denoting a parent GIAI has been captured. When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used (see also section 3.2): **GIAI - ASSEMBLY**

3.9

3.9.4 Global Returnable Asset Identifier (GRAI): AI (8003)

The Application Identifier (8003) indicates that the GS1 Application Identifier data field contains the GRAI (Global Returnable Asset Identifier). The GRAI is used to identify returnable assets.

The GS1 Company Prefix (see section 1.4.4) is allocated by GS1 Member Organisations to the company that allocates the GRAI – here the asset owner or manager of the returnable asset (see section 1.4.4). It makes the number unique worldwide.

The zero in the leftmost position is added to generate an even number of 14 digits in the asset identification number field which enables efficient encoding.

The structure and content of the asset type is at the discretion of the asset owner or manager of the GS1 Company Prefix to uniquely identify each type of asset.

The check digit is explained in section 2.9. Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The optional serial component is assigned by the asset owner or manager of the asset. It identifies an individual asset within a given asset type. The field is alphanumeric and may contain all characters listed contained in Figure 7.11-1.

Figure 3.9.4-1. Format of the element string

Application Identifier	Global Returnable Asset Identifier (GRAI)			
	GS1 Company Prefix	Asset type	Check digit	Serial component (optional)
8 0 0 3	0 N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂		N ₁₃	X ₁ variable X ₁₆

The data transmitted from the barcode reader means that the element string denoting the GRAI has been captured. When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used (see also section 3.2): **GRAI**



770 **3.9.5 Global Individual Asset Identifier (GIAI): AI (8004)**

771 The Application Identifier (8004) indicates that the GS1 Application Identifier data field contains a
772 GIAI (Global Individual Asset Identifier). ~~The GIAI is used as element string may be used~~ for the
773 unique identification of individual assets ~~to provide a means to store relevant data~~.

774 **Note:** Note: This element string must never be used to identify the entity as a trade item or
775 logistic unit. If an asset is transferred between parties, the GIAI cannot be used for ordering
776 the asset. However, asset identification may be exchanged between parties for the purpose of
777 traceability.

778 The GS1 Company Prefix ([see section 1.4.4](#)) is allocated by GS1 Member Organisations to the
779 company that allocates the GIAI ~~here the asset owner or manager~~ of the individual asset (~~see~~
780 [section 1.4.4](#)). It makes the number unique worldwide.

781 The structure and content of the individual asset reference is at the discretion of [the asset owner or](#)
782 [manager, of the GS1 Company Prefix to uniquely identify each individual asset](#). It may contain all
783 characters [listed contained in Figure 7.11-1](#).

784 **Figure 3.9.5-1.** Format of the element string

Application Identifier	Global Individual Asset Identifier (GIAI)				
	GS1 Company Prefix		Individual asset reference		
8 0 0 4	N ₁ ...	N _i	X _{i+1} ...	variable length	X _j (j<=30)

785 The data transmitted from the barcode reader means that the element string denoting a GIAI has
786 been captured. When indicating this element string in the non-HRI text section of a barcode label,
787 the following data title SHOULD be used (see also section [3.2](#)): **GIAI**

790 **4**

791 **4.3 GTIN rules**

792 **4.3.1 Allocating the numbers**

793 **4.3.1.4 Lead Time in re-using a GTIN**

794 A GTIN allocated to a trade item that has become obsolete must not be re-used for another trade
795 item until at least 48 months have elapsed after:

- 796 ■ the expiration date of the last original trade items produced with that number
- 797 *-or-*
- 798 ■ the last original trade items produced with that number have been supplied to the customer.

799 [The following sector-specific rules apply:](#)

- 800 ■ [Apparel](#): In the case of clothing the minimum retention period is reduced to 30 months.
- 801 ■ [Health care](#): Companies must ensure that GTINs allocated to regulated healthcare trade items
802 SHALL never be reused.
803 [Exception](#): regulated healthcare trade items that have been withdrawn from the market and are
804 reintroduced may use the original GTIN if they are reintroduced without any modifications or
805 changes which require a new GTIN as specified by the GTIN Allocation Rules.
806



- Technical industries: GTINs that are marked directly on components and parts, such as used in rail rolling stock and infrastructure, SHALL never be reused (also see 2.1.4 Direct marking).

For other trade items, brand owners should consider a longer period depending upon the type of goods and/or any regulatory framework. For example, steel beams may be stored for many years before entering the supply chain, and processes should be put in place to ensure that the GTIN is not reallocated for a significant period of time.

In addition, when contemplating the re-use of a GTIN, consideration should be given to the use of data associated with the original GTIN by trading partners for statistical analysis or service records, which may continue long after the original trade item was last supplied.

If a GTIN has been assigned to an item, which was then never actually produced, the GTIN may be deleted from any catalogue immediately without first being marked as discontinued. In this exceptional case the GTIN may be re-used 12 months after deletion from the seller's catalogue.

4.3.1.10 GTIN allocation considerations for direct marking

The master data linked to the GTIN marked on the item (see section 2.1.4 Direct Marking) will generally apply for the item at time of production and first purchase. The master data will no longer apply when changes are made to the trade item (refurbishment, upgrade, memory extension, etc.). When such changes are made the GTIN as marked on the item MAY remain the same, and companies will need to ensure that it is clear to all parties which master data may change over time.

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4.5 ~~Allocating Rules for GS1 system~~ asset identifiers

4.5.1 General rule

4.5.1.1 GS1 ~~system~~ asset identifiers

GS1 ~~system~~ asset identifiers can be used to identify any fixed assets of a company. It is left to the discretion of the issuer to determine whether the Global Returnable Asset Identifier (GRAI), AI (8003), or Global Individual Asset Identifier (GIAI), AI (8004), is more suitable for the application concerned.

4.5.1.2 ~~Uniqueness of Lead time in reusing GS1~~ asset identifiers

Asset identifiers must remain unique for a period well beyond the lifetime of the relevant records.

If a company assigns asset identifiers to trade items supplied to its customers, the company must ensure that the asset identifiers are never re-used.

All issuers of asset identifiers must ensure that asset identifiers (GRAIs, GIAIs) allocated for medical devices / equipment used for treatment of a patient SHALL never be reused.


Also GIAIs that are marked directly on safety critical components and parts, such as used in rail, SHALL never be reused.

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4.5.1.3 ~~Responsibility Best practice~~

The asset owner or manager is responsible for the issuance and allocation of GS1 asset identifiers.

 Note: The term 'asset manager' includes manufacturers that issue and allocate asset identifiers to be used during the full lifetime of the asset. Furthermore, best practices may dictate that the trade item manufacturer applies the asset identifiers issued by the asset owner during the manufacturing process (see section 2.3).

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4.5.1.4.5.2 Allocating Global Returnable Asset Identifiers (GRAIs): AI (8003)

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The structure of the element string for a Global Returnable Asset Identifier (GRAI) can include two parts: the mandatory Identification of an asset type and an optional serial component, to distinguish individual assets within the same asset type (see section 2.3.1)

Figure 4.5.1.3-1. Format of the element string

Application Identifier	Global Returnable Asset Identifier (GRAI)														
	GS1 Company Prefix						Asset type						Check digit	Serial component (optional)	
8 0 0 3	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	X ₁ variable X ₁₆

The exact method used to allocate the GRAI is left to the discretion of the issuing organisation. However, a unique number, the asset type, must be assigned for each type of asset being identified, and for ease of administration, the GS1 system recommends that numbers be allocated sequentially and not contain classifying elements.

When it is not possible to assign an asset type (e.g., for museum exhibits), or when the type of asset is not required by the application (e.g., when the item is only used for a single type of asset), then the Global Individual Asset Identifier (GIAI), AI (8004), SHOULD be used.

To encode the following eExamples of iIdentification Numbers-keys in a GS1-128 barcode a zero in the leftmost position must be added to generate the defined length for the 14-digit asset identification number field.

4.5.1.5.4.5.2.1 Identical assets identification

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A single Global Returnable Asset Identifier (GRAI) SHOULD be assigned to a series of identical assets.

Figure 4.5.2.1-1. Examples of GRAI excluding serial number

Asset type	GRAI
50 litre aluminium beer keg	1234567890005
10 litre aluminium beer keg	1234567890012
10 litre wooden beer keg	1234567890029

4.5.1.6.4.5.2.2 Serial component (optional)

The owner of the asset owner or manager assigns the optional serial component. It denotes an individual asset within a given asset type. The field is alphanumeric and is used to distinguish individual assets with the same asset types.

Figure 4.5.2.2-1. Examples of GRAI including serial component

Asset Type	GRAI (incl. the serial component)
50 litre aluminium beer keg	12345678900051234AX01
50 litre aluminium beer keg	12345678900051234AX02
50 litre aluminium beer keg	12345678900051234AX03

4.5.1.7.4.5.3 Allocating Global Individual Asset Identifiers (GIAIs): AI (8004)

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The Global Individual Asset Identifier (GIAI) is structured according to Figure 4.5.31-7 - 1.



Figure 4.5.2-24.5.3-1. Format of the element string

Application Identifier	Global Individual Asset Identifier (GIAI)				
	GS1 Company Prefix		Individual asset reference		
8 0 0 4	N ₁ ...	N _i	X _{i+1} ...	variable length	X _j (j<=30)

The exact method used to allocate the GIAI is left to the discretion of the issuing organisation. However, each GIAI must be unique for each individual asset being identified and, for ease of administration, the GS1 system recommends that GIAIs be allocated sequentially and not contain classifying elements.

4.5.24.5.4 Change of asset ownership

Asset identification numbers are used in a diverse range of business applications ranging from tracking the movements of re-usable packaging trays to recording the life-cycle history of aircraft parts.

If a company sells an asset to another company then the asset identifier SHOULD ideally be replaced by another Global Individual Asset Identifier (GIAI) or Global Returnable Asset Identifier (GRAI) or be removed.

It is permissible for the asset identifier to remain on the item when the ownership changes if the new owner takes responsibility for the GS1 Company Prefix associated with the asset identifier, or when the asset identifier was assigned by the manufacturer.

For further information regarding changes of ownership, please refer to section 1.6.

4.5.34.5.5 Information associated with asset identifiers

The data related to attributes of the asset should be recorded and shared digitally established on a computer file using the GS1 system asset identifier as the key to the information. Examples of the type of information held include the GLN full name and address of the party who owns or manages the asset, the value of the asset, the location of the asset, and the life-cycle history of the asset.

4.13

4.13.2 Mandatory association of element strings

This section defines the element strings that mandate the appearance of another element string on the same physical entity.

Figure 4.13.2-1. Mandatory association of element strings

If element string	Then mandatory associated element string	Comment
AI	Designation	
7020	Refurbishment lot ID	01 and 416 Mandatory association with the GTIN and GLN of production / service location.
7021	Functional status	01 Mandatory association with the GTIN
7022	Revision status	01 and 7021 Mandatory association with the GTIN and functional status.



904

905 **5 Data carriers**

906 **5.5 Barcode production and quality assessment**

907 **5.5.2 Dimensional specifications and operational requirements**

908 **5.5.2.7 GS1 system symbol specification tables**

909 **5.5.2.7.4 Symbol specification table 4 – Trade items —packages/containers not scanned at POS or**
 910 **general retail - also not scanned in general distribution or regulated healthcare (retail or**
 911 **non-retail)**

912

Figure 5.5.2.7.4-1. GS1 system symbol specification table 4

Symbol(s) specified	(*) X-dimension mm (inches)			(**) Minimum symbol height for given X mm (inches)			Quiet Zone		Minimum quality specification
	Minimum	Target	Maximum	For minimum X-dimension	For target X-dimension	For maximum X-dimension	Left	Right	
EAN-13	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	11X	7X	1.5/06/660
EAN-8	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	14.58 (0.574")	18.23 (0.718")	36.46 (1.435")	7X	7X	1.5/06/660
UPC-A	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	9X	1.5/06/660
UPC-E	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	7X	1.5/06/660
GS1 DataBar Omni-directional	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	8.71 (0.343")	10.90 (0.429")	21.78 (0.858")	NA	NA	1.5/06/660
GS1 DataBar Stacked Omni-directional	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.24 (0.718")	27.78 (1.094")	45.54 (1.794")	NA	NA	1.5/06/660
GS1 DataBar Expanded	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	8.99 (0.354")	11.23 (0.442")	22.44 (0.883")	NA	NA	1.5/06/660
GS1 DataBar Expanded Stacked	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.75 (0.738")	23.44 (0.923")	46.86 (1.845")	NA	NA	1.5/06/660
GS1 DataBar Stacked	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	3.43 (0.135")	4.29 (0.169")	8.58 (0.338")	N/A	N/A	1.5/06/660
GS1 DataBar Limited	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	2.64 (0.104")	3.30 (0.130")	6.60 (0.260")	N/A	N/A	1.5/06/660
GS1 DataBar Truncated	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	3.43 (0.135")	4.29 (0.169")	8.58 (0.338")	N/A	N/A	1.5/06/660
ITF-14	0.250 (0.00984")	0.495 (0.0195")	0.495 (0.0195")	12.70 (0.500")	12.70 (0.500")	12.70 (0.500")	10X	10X	1.5/06/660
GS1- 128	0.250 (0.00984")	0.495 (0.0195")	0.495 (0.0195")	12.70 (0.500")	12.70 (0.500")	12.70 (0.500")	10X	10X	1.5/06/660
GS1 DataMatrix (ECC 200) (***)	0.380 (0.0150")	0.380 (0.0150")	0.495 (0.0195")	Height is determined by X-dimension and data that is encoded			1X on all four sides		1.5/08/660



GS1 QR Code (***)	0.380 (0.0150")	0.380 (0.0150")	0.495 (0.0195")	Height is determined by X-dimension and data that is encoded	4X on all four sides	1.5/08/660
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913

(*)	<p>ITF-14 symbols with X-dimensions below 0.635 millimetre (0.0250 inch) SHOULD NOT be printed directly on corrugate with conventional (plate based) processes. The ITF-14 symbol's bar width ratio target is 2.5:1, and the acceptable range is 2.25:1 to 3:1.</p> <p>Section 5.5.3.4 gives full details on when barcodes can be printed at less than the minimum X-dimension. In general, barcodes may only be printed using an X-dimension below 0.264 millimetre (0.0104 inch) or 80 percent magnification under the following conditions:</p> <ul style="list-style-type: none"> ▪ The allowance for X-dimensions between 0.249 millimetre (0.0098 inch) or 75 percent magnification and 0.264 millimetre (0.0104 inch) or 80 percent magnification is only applicable to on demand (e.g., thermal, laser) print processes. For all other printing processes, an X-dimension of 0.264 millimetre (0.0104 inch) is attainable and is the minimum allowable size. ▪ When printing a minimum symbol with any method of printing, the area provided for printing the symbol and the required Quiet Zone should never be less than the area required for an X-dimension of 0.264 millimetre (0.0104 inch). ▪ When printing a minimum symbol with any method of printing, the symbol height SHALL never be truncated.
(**)	<p>The minimum symbol height dimensions listed for all symbologies including EAN/UPC symbols do not include the human readable interpretation (or bearer bars for ITF-14 symbols). The minimum heights of EAN/UPC symbols do not include the extended bars: see section 5.2.1.4.2 for dimensions of the extended bars.</p> <p>Because of the operative scanning environment for EAN/UPC symbols, there is a direct relationship between the symbol's height and width. This means the minimum symbol height listed is tied to the minimum, target, and maximum X-dimension listed.</p> <p>The minimum bar height for ITF-14 and GS1-128 symbols in this operative scanning environment is 12.70 millimetres (0.500 inch), but if the package is physically too small to accommodate this rule, further truncation is permitted. In no case SHALL the bar height be less than 5.08 millimetres (0.200 inch).</p> <p>There is no maximum for the symbol height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Minimum Symbol Height column.</p> <p>Whereas, linear symbol heights are set at a fixed dimension, Composite Components are printed at the same X-dimension as the linear portion of the Composite symbology, and the barcode height varies depending on the amount of data, the X-dimension, and which linear symbol is used in conjunction with the Composite Component. Note that Composite Components have to be printed with a linear symbol such as GS1 DataBar, GS1-128, UPC-A, or EAN-13. ITF-14 cannot be used with Composite Components.</p>
(***)	<p>2D X-dimension - Optical effects in the image capture process require that the GS1 DataMatrix and GS1 QR Code symbols be printed at 1.5 times the equivalent printing X-dimension allowed for linear symbols.</p>

914



Note: See section [2.7](#) to ensure the correct symbol specification table is used.

915